

Section 3: Transporting Cargo Safely

This section tells you about hauling cargo safely. You must understand basic cargo safety rules to get a CDL.

If you load cargo wrong or do not secure it, it can be a danger to others and yourself. Loose cargo that falls off a vehicle can cause traffic problems and others could be hurt or killed. Loose cargo could hurt or kill you during a quick stop or crash. Your vehicle could be damaged by an overload. Steering could be affected by how a vehicle is loaded, making it more difficult to control the vehicle.

Whether or not you load and secure the cargo yourself, you are responsible for:

- Inspecting your cargo,
- Recognizing overloads and poorly balanced weight, and
- Knowing your cargo is properly secured.

These are discussed below.

If you intend to carry hazardous material that requires placards on your vehicle, you will also have to have a hazardous materials endorsement. Section 9 of this manual has the information you need to pass the hazardous materials test.

THIS SECTION COVERS

- Inspecting Cargo
- Cargo Weight & Balance
- Securing Cargo
- Liquids in Bulk
- Other Cargo Needing Care

As part of your pre-trip inspection, check for overloads, poorly balanced weight, and cargo that is not properly secured.

3.1 INSPECTING CARGO

Inspect the cargo and its securing devices again within 25 miles after beginning a trip. Make any adjustments needed. Check the cargo and securing devices as often as necessary during a trip to keep the load secure. A good habit is to inspect again:

- Before Starting

- After you have driven for 3 hours or 150 miles,
- After every break you take during driving.

- Every 3 hours/150 Miles
- After Every Break

Federal, state, and local regulations for commercial vehicle weight, securing cargo, covering loads, and where you can drive large vehicles vary from place to place. Know the rules where you will be driving.

You are responsible for not being overloaded. Here are some definitions of weight you should know:

3.2 WEIGHT & BALANCE

Gross vehicle weight (GVW). The total weight of a single vehicle plus its load.

- Definitions You Should Know

Gross combination weight (GCW). The total weight of a power unit plus trailer(s) plus the cargo.

Gross vehicle weight rating (GVWR). The maximum GVW specified by the manufacturer for a single vehicle plus its load.

Gross combination weight rating (GCWR). The maximum GCW specified by the manufacturer for a specific combination of vehicles plus the load.

Axle weight. The weight transmitted to the ground by one axle or one set of axles.

Tire load. The maximum safe weight a tire can carry at a specified pressure. This rating is stated on the side of each tire.

Suspension systems. Suspension systems have a manufacturer's weight capacity rating.

Coupling device capacity. Coupling devices are rated for the maximum weight they can pull and/or carry.

You must keep weights within legal limits. States have maximums for GVWs, GCWs and axle weights. Often, maximum axle weights are set by a bridge formula. A bridge formula permits less maximum axle weight for axles that are closer together. This is to prevent overloading bridges and roadways.

- Legal Weight Limits

Overloading can have bad effects on steering, braking, and speed control. Overloaded trucks have to go very slow on upgrades. Worse, they may gain too much speed on downgrades. Stopping distance increases. Brakes can fail when forced to work too hard.

During bad weather or in mountains, it may not be safe to operate at legal maximum weights. Take this into account before driving.

The height of the vehicle's center of gravity is very important for safe handling. A high center of gravity (cargo piled up high or heavy cargo on top) makes your vehicle more likely to tip over. It is most dangerous in curves or if you have to swerve to avoid a hazard. It is very important to distribute the cargo so the center of gravity is as low as possible. Put the heaviest parts of the cargo under the lightest parts.

- Don't Be Top Heavy

Poor weight balance can make vehicle handling unsafe. Too much weight on the steering axle can cause hard steering. It can damage the steering axle and tires. Under-loaded front axles (caused by shifting weight too far to the rear) can make the steering axle weight too light to steer safely. Too little weight on the driving axles can cause poor traction. The drive wheels may spin easily. During bad weather, the truck may not be able to keep going. Weight that is loaded so there is a high center of gravity causes greater chance of rollover. On flat bed vehicles, there is also a greater chance that the load will shift to the side.

- Balance the Weight

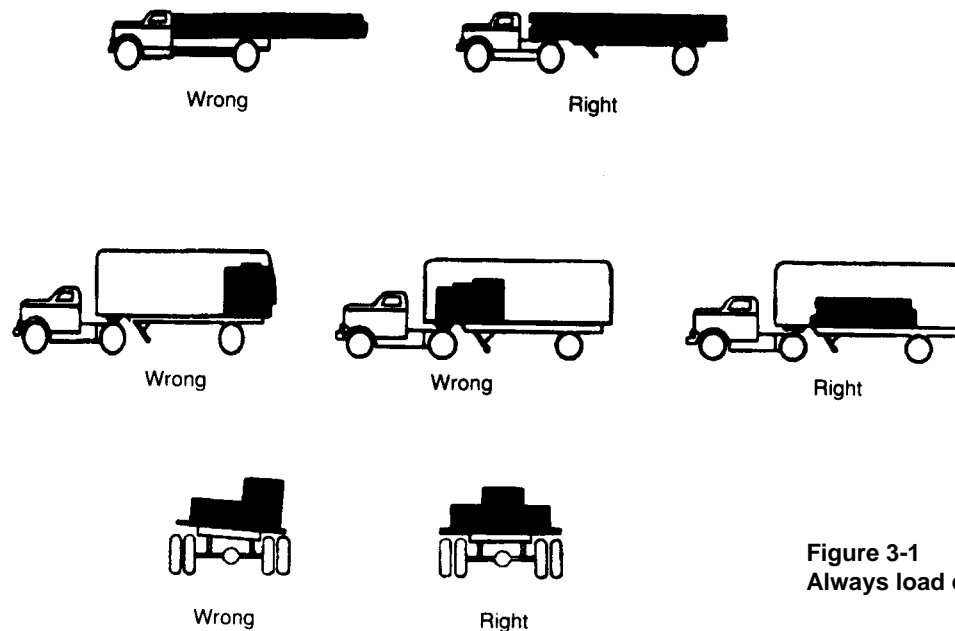


Figure 3-1
Always load cargo the right way!

Blocking is used in the front, back, and/or sides of a piece of cargo to keep it from sliding. Blocking is shaped to fit snugly against cargo. It is secured to the cargo deck to prevent cargo movement. **Bracing** is also used to prevent movement of cargo. Bracing goes from the upper part of the cargo to the floor and/or walls of the cargo compartment.

3.3 SECURING CARGO - Blocking and Bracing

On flatbed trailers or trailers without sides, cargo must be secured to keep it from shifting or falling off. In closed vans, tiedowns can also be important to prevent cargo shifting that may affect the handling of the vehicle. Tiedowns must be of the proper type and proper strength. The combined strength of all cargo tiedowns must be strong enough to lift one and one half times the weight of the piece of cargo tied down. Proper tiedown equipment must be used, including ropes, straps, chains, and tensioning devices (winches, ratchets, clinching components). Tiedowns must be attached to the vehicle correctly (hook, bolt, rails, rings).

- Cargo Tie-Downs

Cargo should have at least one tiedown for each 10 feet of cargo. Make sure you have enough tiedowns to meet this need. No matter how small the cargo, it should have at least two tiedowns holding it.

There are special requirements for securing various heavy pieces of metal. Find out what they are if you are to carry such loads.

Front end header boards ("headache racks") protect you from your cargo in case of a crash or emergency stop. Make sure the front end structure is in good condition. The front end structure should block the forward movement of any cargo you carry.

- Header Boards

There are two basic reasons for covering cargo; (1) to protect people from spilled cargo, and (2) to protect the cargo from weather. Spill protection is a safety requirement in many states. Be familiar with the laws in the states you drive in.

- Covering Cargo

You should look at your cargo covers in the mirrors from time to time while driving. A flapping cover can tear loose, uncovering the cargo, and possibly block your view or someone else's.

You cannot inspect sealed loads, but you should check that you don't exceed gross weight and axle weight limits.

Containerized loads generally are used when freight is carried part way by rail or ship. Delivery by truck occurs at the beginning and/or end of the journey. Some containers have their own tiedown devices or locks that attach directly to a special frame. Others have to be loaded onto flatbed trailers. They must be properly secured just like any other cargo.

- Sealed and Containerized Loads

Test Your Knowledge

1. What three things related to cargo are drivers responsible for?
2. How often must you stop while on the road to check your cargo?
3. How is Gross Combination Weight Rating different from Gross Combination Weight?
4. Name two situations where legal maximum weights may not be safe.
5. What can happen if you don't have enough weight on the front axle?

**These questions may be on the test.
If you can't answer them, reread 3.1 and 3.2.**

Dry bulk tanks require special care because they often have a high center of gravity, and the load can shift. Be extremely cautious (slow and careful) going around curves and making sharp turns.

Hanging meat (suspended beef, pork, lamb) in a refrigerated truck can be a very unstable load with a high center of gravity. Particular caution is needed on sharp curves such as off ramps and on ramps. Go slow.

Livestock can move around in a trailer, causing unsafe handling. With less than a full load, use false bulkheads to keep livestock bunched together. Even when bunched, special care is necessary because livestock can lean on curves. This shifts the center of gravity and makes rollover more likely.

Over length, over width, and/or over weight loads require special transit permits. Driving is usually limited to certain times. Special equipment may be necessary such as "wide load" signs, flashing lights, flags, etc. Such loads may require a police escort or pilot vehicles bearing warning signs and/or flashing lights. These special loads require special driving care.

3.4 OTHER CARGO NEEDING SPECIAL ATTENTION

- Dry Bulk

- Hanging Meat

- Livestock

- Oversized Loads

Test Your Knowledge

1. What is the minimum number of tie-downs for any flatbed load?
2. What is the minimum number of tie-downs for a 20 ft. load?
3. Name the two basic reasons for covering cargo on an open bed.
4. What must you check before transporting a sealed load?

**These questions may be on the test.
If you can't answer them, reread Section 3.3.**